

# NOTES:

## PERSONAL COMPUTER MONITORING AND CONTROL SOFTWARE

- THE SWITCHGEAR REMOTE MASTER CONTROL PANEL SHALL BE CAPABLE OF COMMUNICATING WITH A PERSONAL COMPUTER TO DISPLAY GENERATOR SET, TRANSFER SWITCH AND SWITCHGEAR INFORMATION.
- SYSTEM SHALL BE DESIGNED SO IT WILL NOT DETRACT FROM THE PRIMARY FUNCTION OF THE SWITCHGEAR.
- SOFTWARE SHALL RUN UNDER WINDOWS NT PLATFORM.
- SOFTWARE INTERFACE SHALL BE OBJECT-ORIENTED HIGH RESOLUTION GRAPHICAL.
- SOFTWARE SHALL HAVE THE ABILITY TO INTEGRATE TO THE EXISTING SIEMENS BUS SYSTEM. THE EXISTING SIEMENS BUS SYSTEM WILL BE UPGRADED AS FOLLOWS:
  - CONNECTION BETWEEN THE TWO SYSTEMS SHALL BE THROUGH A ETHERNET CONNECTION UTILIZING A 3 COM 30000 10/100 PC.
  - THE SIEMENS WAPM APPLICATION SOFTWARE MUST BE UPGRADED TO RATION 4.0 (AVAILABLE THE FIRST QUARTER OF 1998).
  - THE PARTY PERFORMING THE SOFTWARE UPGRADE OF THE EXISTING SIEMENS SYSTEM MUST COORDINATE WITH THE PERSONNEL PROGRAMMING THE NEW MONITORING SYSTEM IN ORDER TO MONITOR AND CONTROL THE PROPER DATA POINTS BETWEEN THE SYSTEMS.
- THE SOFTWARE SHALL PROVIDE THE FOLLOWING:
  - EMERGENCY POWER SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM
    - SOFTWARE SHALL ALLOW ACCESS TO CONTROL FUNCTIONS FROM THE SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM, AS DEFINED IN OPERATIONAL PROCEDURE.
    - SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM SHALL DISPLAY INDIVIDUAL SYSTEM COMPONENTS ALARM CONDITIONS IN BRIGHT COLORS.
  - THE SOFTWARE SHALL DISPLAY THE FOLLOWING INFORMATION:
    - GENERATOR SET OPERATIONAL INFORMATION
    - SWITCHGEAR OPERATIONAL INFORMATION
- THE SOFTWARE SHALL DISPLAY AND ALLOW INFORMATION FROM THE FOLLOWING TO BE MONITORED:
  - GENERATOR SETS
  - SWITCHGEAR

## COMMUNICATIONS

- THE SWITCHGEAR SHALL BE CAPABLE OF COMMUNICATING WITH THE GENERATOR SET CONTROLLER THROUGH A TWISTED PAIR OF WIRE.
- THE SWITCHGEAR WILL RECEIVE NON-VITAL GENERATOR SET ENGINE INFORMATION THROUGH A TWISTED PAIR OF WIRE AND AS AN OPTION DISPLAY ENGINE WARNINGS AND FAULTS ON AN ANNUNCIATOR MODULE LOCATED ON THE ASSOCIATED GENERATOR SET CONTROL CUBICLE AND ON THE PERSONAL COMPUTER SCADA SYSTEM.
- ENGINE GENERATOR START, STOP, GOVERNOR, AND VOLTAGE REGULATOR CONTROL SHALL BE VIA HARD WIRE INTERCONNECTIONS.
- THE SWITCHGEAR WILL RECEIVE GENERATOR SET ENGINE INFORMATION THROUGH A TWISTED PAIR OF WIRE AND AS AN OPTION DISPLAY ENGINE INFORMATION ON A CONTROL INTERFACE MODULE LOCATED ON THE ASSOCIATED GENERATOR SET CUBICLE.
- THE CONTROL INTERFACE MODULE SHALL HAVE A LIGHTED DISPLAY WITH ALPHANUMERIC CHARACTERS FOR MESSAGES AND A NUMERIC KEYPAD.
- THE CONTROL INTERFACE MODULE SHALL COMMUNICATE WITH THE PLC.
- THE FOLLOWING GENERATOR FUNCTIONS SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
  - ALL OUTPUT VOLTAGES - SINGLE PHASE, THREE PHASE AND LINE-TO-LINE.
  - ALL SINGLE PHASE AND THREE PHASE CURRENTS.
  - GENERATOR SET OUTPUT FREQUENCY.
  - GENERATOR SINGLE PHASE AND AVERAGE THREE PHASE POWER FACTOR.
  - TOTAL AND PHASE KILOWATT LOADING, TOTAL AND PHASE REACTIVE POWER LOADING, TOTAL KILOWATT-HOURS, TOTAL KILOWATT-HOURS.
  - PERCENTAGE OF RATED GENERATOR POWER.
- THE FOLLOWING ENGINE PARAMETERS SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
  - ENGINE COOLANT TEMPERATURE
  - ENGINE OIL PRESSURE
  - RIGHT EXHAUST TEMPERATURE
  - LEFT EXHAUST TEMPERATURE
  - BATTERY VOLTAGE
  - ENGINE RPM
- THE FOLLOWING GENERATOR ENGINE OPERATIONAL INFORMATION SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE:
  - CYCLE CRANK TIME SETPOINT
  - TOTAL CRANK TIME SETPOINT - TOTAL TIME AFTER WHICH AN OVERCRANK FAULT IS DECLARED
  - COOLDOWN TIMER SETTING
  - OVERSPEED SETTING
  - ENGINE LOW OIL PRESSURE SETTING @ RATED SPEED
  - ENGINE LOW OIL PRESSURE SETTING @ IDLE SPEED
  - HIGH ENGINE COOLANT TEMPERATURE SETTING
  - LOW ENGINE COOLANT TEMPERATURE SETTING
  - CRANK TERMINATE SPEED SETTING
- THE FOLLOWING GENERATOR SET SHUTDOWN SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
  - EMERGENCY STOP
  - HIGH COOLANT TEMPERATURE
  - HIGH ENGINE OIL TEMPERATURE
  - CONTROLLER DIAGNOSTIC FAULT
  - COOLANT LOSS
  - OVERCRANK
  - OVERSPEED
  - OVER-VOLTAGE
  - UNDERFREQUENCY
  - UNDERVOLTAGE
  - SPEED SENSOR SIGNAL OUT OF RANGE
  - SPEED SENSOR SIGNAL TOO HIGH

- THE FOLLOWING GENERATOR SET WARNINGS (PRE-ALARMS) SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE GENERATOR INTERFACE MODULE:
  - BATTERY CHARGER FAILURE
  - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL OUT OF RANGE
  - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL TOO HIGH
  - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL TOO LOW
  - ENGINE COOLANT TEMPERATURE SIGNAL LOSS
  - GROUND FAULT DETECTED - SPARE FAULT INPUT
  - HIGH BATTERY VOLTAGE
  - HIGH COOLANT TEMPERATURE
  - LOW BATTERY VOLTAGE
  - LOW COOLANT TEMPERATURE
  - LOW OIL PRESSURE
  - ENGINE OIL PRESSURE SENSOR SIGNAL OUT OF RANGE
  - ENGINE OIL PRESSURE SENSOR SIGNAL TOO HIGH
  - ENGINE OIL PRESSURE SENSOR SIGNAL TOO LOW
- PROVIDE ADDITIONAL SOFTWARE, SOFTWARE MODIFICATIONS, HARDWARE AND INTERFACE DEVICES CIRCUITS, ETC. TO THE EXISTING BUILDING SCADA SYSTEM TO INCORPORATE AND UPGRADE FOR ETHERNET COMMUNICATIONS AS REQUIRED FOR MONITORING AND CONTROL THE OPERATION OF THE GENERATORS PARALLELING AND CONTROL SYSTEMS AND OTHER ALARM DEVICES AS SHOWN ON DRAWINGS.
- PROVIDE SIEMENS ISOLATED MULTI-DROP CONVERTERS, ONE AT B2 LEVEL OUTSIDE OF FUEL OIL TANK ROOM, ADJACENT TO THE FUEL OIL MANAGEMENT PANEL AND ONE AT THE GENERATOR BULKHEAD AS SHOWN ON DRAWING NOS. E3-02 AND E4-03. EACH CONVERTER HAS 4 PORTS THAT CAN SUPPORT 32 DEVICES EACH, FOR A TOTAL OF 128 DEVICES ON EACH OF THE PC'S SERIAL PORTS. CONFIGURE, INTEGRATE AND TEST THE SCADA SYSTEM AS FOLLOWS:
  - CONFIGURE THE SYSTEM, INCLUDING INSTALLATION OF APPLICABLE SOFTWARE, DEVELOPMENT OF DISPLAY SCREENS, POINT ADDRESS AND DESCRIPTION.

## GENERATOR PARALLELING GEAR EQUIPMENT

